NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

ROOF RUNOFF MANAGEMENT

(No.)
CODE 558

DEFINITION

A facility for collecting, controlling, and disposing of runoff water from roofs.

PURPOSE

To prevent roof runoff water from flowing across concentrated waste areas, barnyards, roads, and alleys, and to reduce pollution and erosion, improve water quality, prevent flooding, improve drainage, and protect the environment.

CONDITIONS WHERE PRACTICE APPLIES

The practice applies where: (1) a roof runoff management facility is included in an overall plan for a waste management system; (2) roof runoff water may come in contact with wastes or cause soil erosion; and (3) barnyard flood protection or improved drainage is needed.

DESIGN CRITERIA

Capacity. Design of roof runoff management facilities shall be based on the runoff from a 10-year frequency, 5-minute rainfall except that a 25-year frequency, 5-minute rainfall shall be used to design such facilities for exclusion of roof runoff from waste treatment lagoons, waste storage structures, or similar practices. Rainfall from figures 1 and 2 or reliable local records may be used for design.

Downspout. Spacing of downspouts shall be determined by the shape and size of the roof area served. Strainers should be considered at the head of downspouts.

The flow rates for downspouts shall be calculated by using the orifice discharge equation with a coefficient of discharge (c) not greater that 0.65.

Materials. Roof gutters and downspouts may be made of aluminum, galvanized steel, wood, or plastic. Aluminum gutters and downspouts shall have a nominal thickness of at least 0.07 and 0.05 cm, (0.027 and 0.020 in), respectively. Galvanized steel gutters and downspouts shall be at least 28 gage. Wood shall be clear and free of knots. A water repellant preservative shall be applied to the flow of areas of wood other than redwood, cedar, or cypress. Plastics shall contain ultraviolet stabilizers. Dissimilar metals shall not be in contact with each other.

Supports. Gutter supports shall have sufficient strength to withstand anticipated water, snow, and ice loads. They shall have a maximum spacing of 120 cm (48 in) for galvanized steel and 81 cm (32 in) for aluminum or plastic. Wood gutters shall be mounted on fascia boards using furring blocks that are a maximum of 61 cm (24 in) apart. Downspouts shall be securely fastened at the top and bottom with intermediate supports that are a maximum of 3 m (10 ft) apart.

Outlets. The water from roof runoff management facilities may empty into surface drains or underground outlets, or onto the ground surface. When downspouts empty onto the ground surface, there shall be an elbow to direct water away from the building and splash blocks or other protection shall be provided to prevent erosion.

Underground collection pipes at the end of downspouts shall be non-perforated corrugated polyethylene tubing, PVC pipe, or corrugated metal pipe. Underground outlet standard (620) shall apply to the portion of the outlet that is underground.

Protection. Roof runoff management facilities and outlets shall be protected from damage by livestock and equipment. Where appropriate, snow and ice guards may be installed on roofs to protect gutters and reduce the hazard to humans and animals below. Gutters may be installed below the projection of the roofline to further reduce gutter damage from snow and ice. "Gutter Guards" should be installed to reduce the potential for the gutter being clogged by leaves and the like.

ADDITIONAL CRITERIA FOR ROOF RUNOFF MANAGEMENT

For the 10 year frequency storm, the values of 0.54 in/5 min or 0.16 cfs per 1000 ft^2 of roof area may be used to size gutters and downspouts. For the 25-year frequency storm, 0.64 in/5 min or 0.20 cfs per 1000 ft^2 of roof area may be used.

Chapter 10, pages 10-2 and 10-3, of Agricultural Waste Management Field Handbook (NEH, part 561) provides details of the procedure to size gutters and downspouts.

CAUTION - Downspout size may limit the design capacity of the system. The capacity of the system is the lesser of the gutter or the downspout flow rate.

CONSIDERATIONS

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Effects on downstream flows or aquifers that would affect other water uses.
3. Potential use for water management to conserve water.

Water Quality

1. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.
2. The effects on wetland and water-related wildlife habitats associated with the practice.

PLANS AND SPECIFICATIONS

Plans and specifications for installing roof runoff management facilities shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Gutters normally will be installed below a line formed by projecting the roofline down and out away from the building.

Gutters, downspouts, and associated hardware shall be of similar or compatible materials.

OPERATION AND MAINTENANCE

Regular inspection of roof runoff management systems should be part of the on-going Livestock Management Program. Gutters should be cleaned in the late fall after leaf drop. Other system components should be inspected after storm events.

Maintenance and repairs will be performed as needed to facilitate the intended purpose of the roof runoff management system.

REFERENCES

NRCS - Agricultural Waste Management Field Handbook, Chapter 10
NRCS - Conservation Practice Standard Code 620 - Underground Outlet

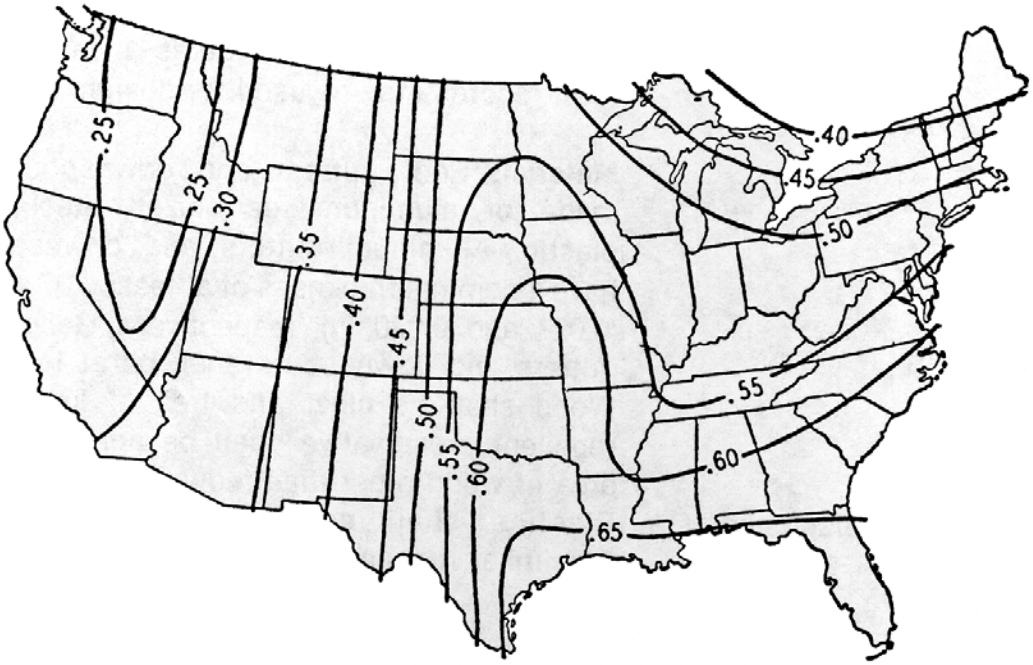

Figure 1.—Ten-year frequency, five-minute rainfall (inches).

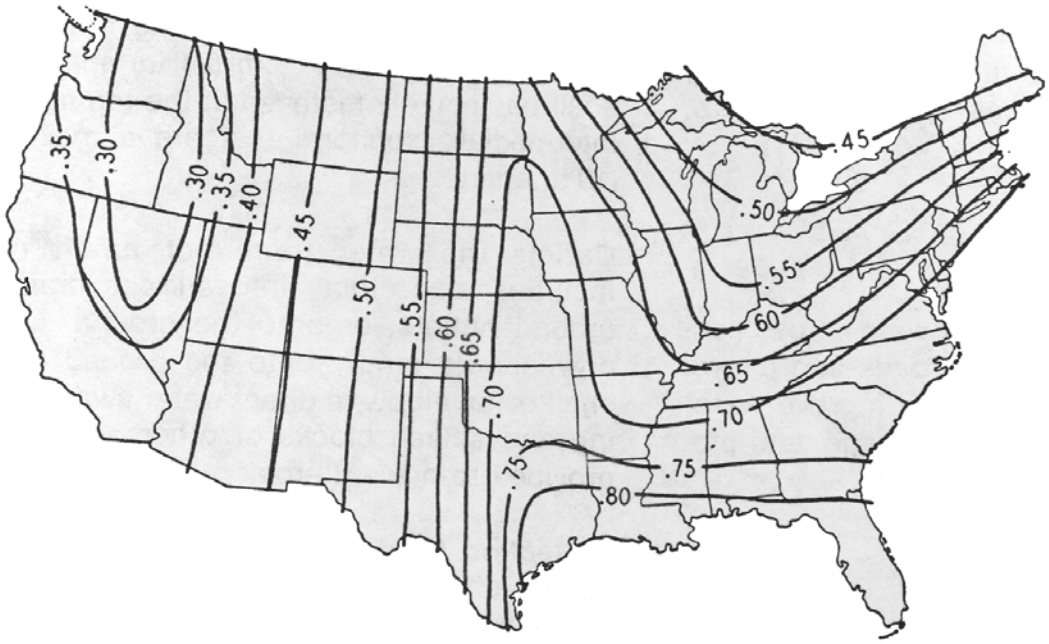

Figure 2.—Twenty-five-year frequency, five-minute rainfall (inches).